Small DNA changes, life or death consequences

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Two recent papers by CIRM grantees highlight the importance of understanding basic stem cell biology while developing new cures. Both have to do with chemical modifications to the DNA â called epigenetics.

One of the two papers shows that an epigenetic change in DNA, called methylation, changes dramatically as human embryonic stem cells mature into specific cell types; the other shows that even subtle DNA methylation differences alter the way a cell behaves.

The first paper, by Jeanne Loring at The Scripps Research Institute, working with scientists in Singapore and New York, provides detailed maps of DNA methylation over the entire 3 billion "letters" that make up our DNA. By comparing methylation patterns of human embryonic stem cells and more mature cells, the scientists tracked the large number of epigenetic changes, many of them surprises, that occur when cells differentiate.

A press release quotes first author Louise Laurent as saying:

"The data are publicly available, and we are looking forward to learning what other scientists discover from using this information for their own studies on individual genes, embryonic development, and stem cells."
The second paper, from UCLA, focuses on epigenetic differences in pancreatic cancers, showing that differences in these modifications translate to different responses to chemotherapy. This means that a few DNA modifications here or there could mean life or death.

In a press release the authors say the next step is to develop a test doctors can use to figure out which patients will respond well to standard chemotherapy and which need an alternative treatment.

Taken together, the papers make a compelling case for how basic biology research such as understand DNA modifications can inform scientists who are actively pursuing cures.

Genome Research, February 4, 2010
CIRM funding: Jeanne Loring (RT1-1108 and TR1-01250)

Journal of Clinical Oncology, February 8, 2010
CIRM funding: Siavash Kurdistani (RN1-05505)

A.A.

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